storm: hence here, also, other causes than rain determine the general easterly progression. Whatever effect rain would have is overcome by stronger causes. The separation of a cyclone into two independent storms is probably aided by the irregular distribution of rain.

Inequality in the strength of the inblowing winds is a result of irregular distribution of barometric pressure in the regions around the storm; and the stronger indraught will come from the higher pressure, because the gradients will be steepest on that side. Thus, in the case of the West India hurricanes, the higher pressure is to the north or north-east in the 'horse latitudes' above named, and the lower pressure to the south, near the equator; and the northerly winds will therefore be stronger than the southerly. The stronger the wind, the greater its centrifugal force;

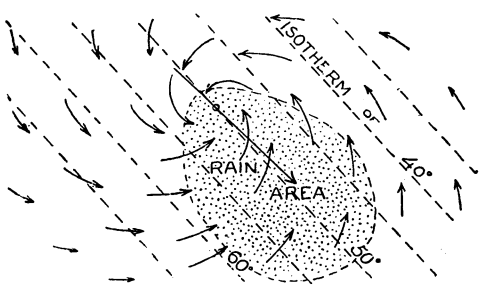



FIG. 16.

and, if this is not equal on all sides, the centre of lowest pressure will be drawn toward the point where it is strongest. This will be where it has to bend sharply around from its original direction, and may average about 135° from the source of the wind: hence, if the stronger wind come from the north-east, the storm-centre will move west; if from the east, north-west, as in fig. 17; and so on. Consequently, this cause will aid the first named in requiring the storm to describe a curved track in passing from the torrid to the temperate zone. It will also aid the coalescing of two neighboring storms, which has not unfrequently been observed; but, as a rule, it plays a subordinate part in determining the direction of advance. The slower advance of such of our storms as have extra strong winds on their western side (Loomis) is probably also due to this cause.

The fourth cause of a storm's advance is a peculiar effect of the deflective force arising from the earth's rotation. It has already been shown that this force increases toward the poles: it will therefore be greatest on the polar side of a cyclone; and the greater the

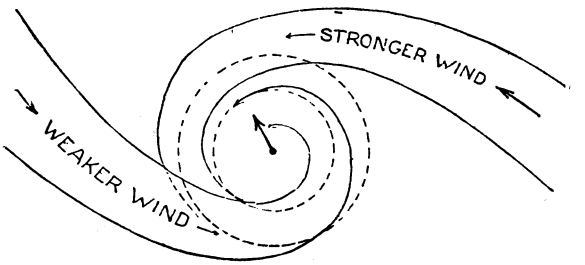


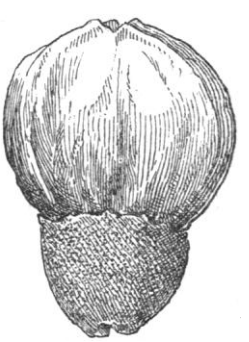

FIG. 17.

storm's diameter, the more marked the difference between the two sides. Its effect will be to make the centrifugal force on the two sides unequal, as in the previous cause; but the resultant motion will here be always from the equator. In the absence of other causes of motion, cyclones would therefore move along meridians: as it is, they nearly always have a more or less pronounced polar tendency; and their failure to move directly from the equator is due to the other causes of progression already mentioned.

*(To be continued.)*

## *A COMBINATION WALNUT.*

A PECULIAR nut has recently been sent to me from Mr. S. L. Bingaman, Pughtown, Chester county, Penn. It was found on his lawn under a black-walnut tree (Juglans nigra). Mr. Bingaman says, "There is a pecan about sixty feet from it [the walnut-tree], and a shellbark some three hundred yards off." The nut is divided into two parts, as viewed upon the outside. There is a small portion at the base end, which has a covering similar to that of a black walnut. The upper and larger part of the nut has a covering closely resembling that of a shellbark (Carya alba). This exocarp is four-valved, and a partial separation has taken place at the upper end. In its texture and adherence to the shell this covering is much like that of the ordinary black walnut. Upon cutting the nut in two, the shell



(endocarp) is found thick, horny, and in all respects like that of J. nigra. The lower portion of the shell projects into the lower section of the nut, and resembles the point of a butternut. The engraving is from a carefully executed drawing, representing the nut of natural size.

The matter as above presented is left in the hands of those more familiar with subjects in teratology. There is no doubt that in the cross-fertilization of plants we may have a deviation from the parent form, even in the development of the seed thus fertilized, or in its surrounding parts. Some strawberry-growers are very careful what 'perfect' varieties are grown among their pistillate sorts to fertilize them. The fleshy receptacle, which is the edible portion of the strawberry, is more remote from the ovules which are fertilized on its surface than the covering of a shellbark or walnut is from the embryo within.

Hybridization between closely related genera is well established in several cases. Sachs mentions that it has been observed between species of Lychnis and Silene, Rhododendron and Azalea, Rhododendron and Rhodora, Azalea and Rhodora, Rhododendron and Kalmia, Aegilops and Triticum, and between Echinocactus, Cereus, and Phylocactus. The two genera Juglans and Carya compose a small order of closely related species. A study of the generic characters, as set down in the classification of these species, does not reveal any more striking difference than that shown in the exocarp. The male and female flowers are separated on the same tree (monoecious), and pollen must pass from flower to flower. This fertilizing-dust is produced in great abundance; and the distance between the black walnut and the pecan, or even the shellbark, is easily traversed by the pollen. There is probably no difficulty in the way of hybridizing from a difference of time in the flowering of the species. Byron D. Halsted.

New York, Oct. 26, 1883.

## *MANAYUNKIA SPECIOSA.*

In a paper, illustrated with a plate, recently presented to the Academy of natural sciences of Philadelphia, Professor Joseph Leidy describes Manayunkia as a cephalobranchiate annelid living in fresh water, the only one of the order yet discovered not living in the ocean. It was found with the equally remarkable polyzoan Urnatella, with its tubes of mud attached to the same stones, in the Schuylkill River, at Philadelphia. It was first noticed, and a brief description given of it, in the Proceedings of the academy in 1858.

Manayunkia is nearly related to the marine genus Fabricia, with a species of which, described by Professor Verrill, the writer compared it, through specimens collected at Newport, R.I., and Gloucester, Mass. Manayunkia has not been observed elsewhere until recently, when it was found by Mr. Edward Potts, attached to a fragment of pine bark from Egg-Harbor River, New Jersey.

The tubes of Manayunkia are simple or compound, and in one instance five tubes branched and were pendent from a common stock in a candelabra-like manner. The little worm is very active and sensitive, and on the slightest disturbance withdraws into its tube. When quiet it protrudes its head, and spreads its cephalic tentacles or branchiae. The mature worm is three or four millimetres long, and is divided into twelve segments, including the head. The color is olive-greenish, due to the bright green blood circulating in the vessels of the animal. The head is furnished with a pair of conspicuous eyes, and supports a lateral pair of lophophores, each provided with sixteen cylindrical tentacles, invested with actively moving cilia, and closely resembling those of the polyzoa. The segments succeeding the head are provided with lateral fascicles of locomotive setae, and in addition, except the first one, are further provided with fascicles of pedal hooks.

The seventh segment is much larger than any of the others, and further differs from them in being greatly expanded in front; so that it gave rise to the idea that the worm undergoes division, though the process was at no time observed. The intestine is quite simple. The chief portions of the vascular system consist in a vast sinus enclosing the intestinal canal, giving off lateral pairs of branches to the segments, and a large vessel which extends from each side of the head into one of the tentacles, which is larger than the others. The blood is bright green, and is observed to be incessantly pumped into and expelled from the larger pair of tentacles. Ovaries occupy the segments from the fourth to the sixth inclusive. Organs supposed to be the testes extend from within the head into the third segment.

Manayunkia lays its eggs and rears its young within its own tube. The young, measuring about three-fourths of a millimetre, had the body divided into nine segments, and each lophophore provided with four tentacles.

In the species of Fabricia of our coast the number of segments of the body is the same as in Manayunkia; but the lophophores supporting the tentacles, instead of being simple, are trilobed or trifurcate. Fabricia has eyes in the tail, or last segment, as well as in the head, which is not the case with Manayunkia.

## *DRAINAGE SYSTEM AND LOESS DISTRIBUTION OF EASTERN IOWA.*

These are described by Mr. W. J. McGee in a recent communication to the Philosophical society of Washington. The Mississippi River, where it forms the eastern limit of Iowa, flows somewhat to the east